HAI Business Data is Lumpier

- USWest ND

North Dakota US West WCs

CLLI	HAI Business Lines	BCPM Business Lines
ALXNNDBC	-	29
BLFDNDBC	1	247
BSMRNDBC	15,570	12,998
CSLTNDBC	238	245
DCSNNDBC	3,044	2,829
DNSTNDBC	-	308
FAMTNDBC	58	62
FARGNDBC	15,613	15,779
GDFRNDBC	11,960	10,162
GFABNDBC	401	1,793
GFTNNDBA	829	1,412
GRNRNDBC	69	97
GWNRNDBC	-	106
HLBONDBC	153	197
HTTNNDBC	79	161
JMTWNDBC	2,930	2,899
KNDRNDBC	68	109
LNRDNDMW	27	64
LRMRNDBA	178	250
LSBNNDBC	294	327
MANVNDBC	2	39
MINTNDBA	7	137
MNDNNDBA	2,562	1,839
MYVLNDBC	521	466
NWODNDBC	51	203
PMBNNDBC	-	234
ROLLNDBC	142	982
RYNLNDBC	18	45
THSNNDBC	91	86
VLCYNDBC	1,471	1,475
WFRGNDBC	5,698	4,878
WHTNNDBC	2,688	2,378
WLSTNDBC	2,731	2,292
WTCYNDBA	137	209
WYNDNDBA	75	97

HAI Special Access Line Count is Questionable

- HAI for C&P Maryland
  - 2,342,736 Multi-line business
  - 126,358 Single-line business
  - 468,250 Special access lines
- HAI for USWest North Dakota
  - 67,706 Multi-line business
  - 12,742 Single-line business
  - 97,742 Special access lines
- USWest Reported for North Dakota
  - 25,677 Special Access lines

HAI Geocoded Data is Questionable

- Many census blocks with households are not covered by either clusters or sub-clusters
  - Units may be trued up but actual location needs for network are lost

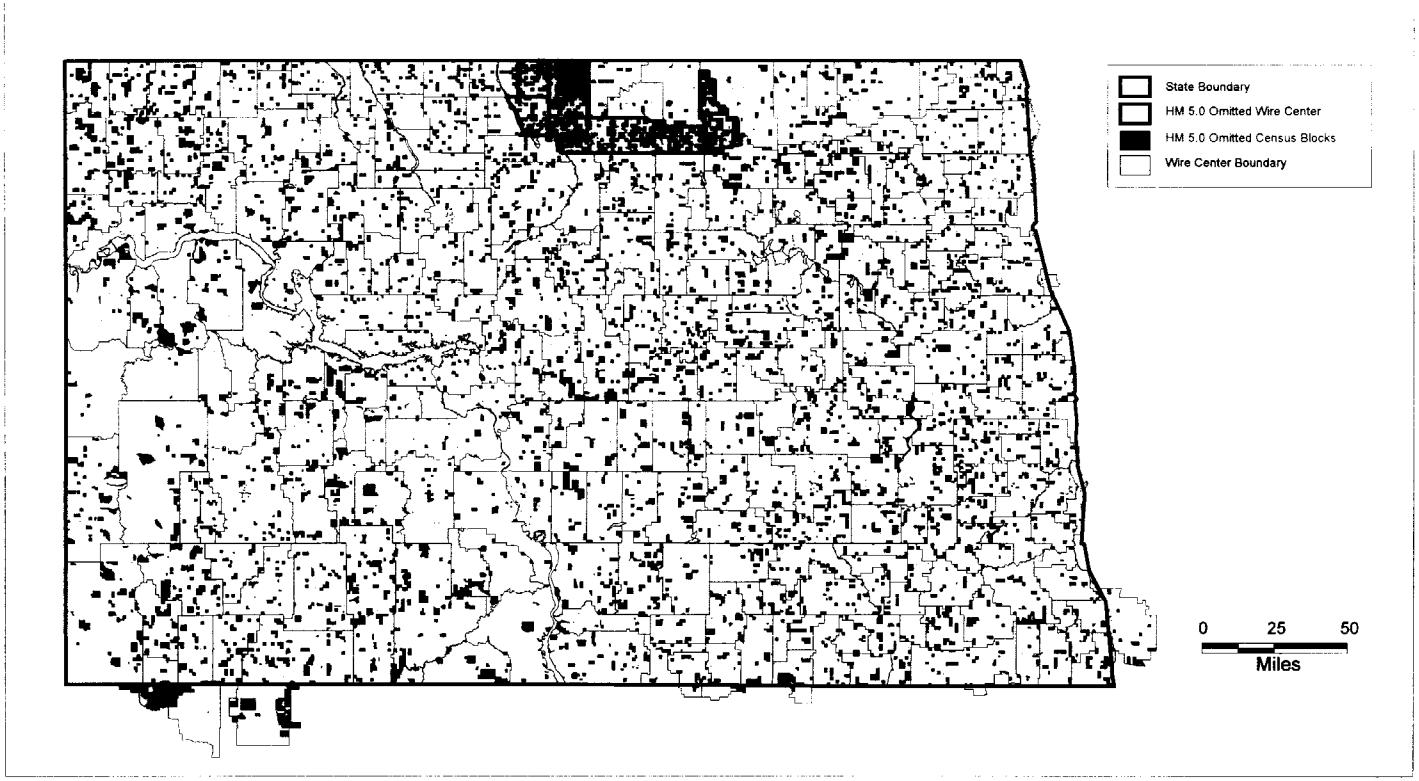
HAI Geocoded Data is Questionable

North Dakota US West WCs

CLLI	Missing Census Blocks	Missing Households	Total Households	Percent Missing Households	Missing Business Lines	Total Business Lines	Percent Missing Business Lines
ALXNNDBC	37	74	432	17.2%	8	46	16.8%
BLFDNDBC	7	7	467	1.5%	0	250	0.1%
BSMRNDBC	46	449	23,324	1.9%	44	12,997	0.3%
CSLTNDBC	30	43	1,019	4.3%	3	255	1.1%
DCSNNDBC	87	438	7,277	6.0%	179	2,850	6.3%
DNSTNDBC	10	19	1,247	1.6%	0	308	0.1%
FAMTNDBC	30	38	408	9.3%	1	71	1.5%
FARGNDBC	40	669	31,670	2.1%	569	15,778	3.6%
GDFRNDBC	32	756	18,998	4.0%	155	10,162	1.5%
GFABNDBC	58	166	3,596	4.6%	35	1,800	1.9%
GFTNNDBA	48	179	2,234	8.0%	103	1,412	7.3%
GRNRNDBC	28	54	424	12.8%	2	100	1.8%
GWNRNDBC	36	66	423	15.6%	11	120	9.1%
HLBONDBC	55	69	1,052	6.5%	19	207	9.0%
HTTNNDBC	9	16	430	3.7%	0	161	0.0%
JMTWNDBC	80	505	6,740	7.5%	166	2,904	5.7%
KNDRNDBC	14	26	641	4.0%	0	113	0.2%
LNRDNDMW	18	34	397	8.6%	0	64	0.0%
LRMRNDBA	32	61	785	7.8%	0	250	0.0%
LSBNNDBC	27	87	1,215	7.2%	27	329	8.3%
MANVNDBC	17	26	342	7.7%	0	40	0.0%
MINTNDBA	16	24	447	5.4%	0	137	0.0%
MNDNNDBA	55	445	6,823	6.5%	247	1,862	13.3%
MYVLNDBC	27	26	1,249	2.1%	5	472	1.0%
NWODNDBC	60	340	724	46.9%	25	209	12.2%
PMBNNDBC	21	17	296	5.8%	15	239	6.4%
ROLLNDBC	17	23	2,446	0.9%	2	983	0.2%
RYNLNDBC	44	163	510	32.0%	38	48	77.8%
THSNNDBC	11	15	536	2.8%	1	94	1.5%
VLCYNDBC	80	573	3,409	16.8%	275	1,476	18.6%
WFRGNDBC	40	203	7,993	2.5%	183	4,875	3.8%
WHTNNDBC	58	256	5,266	4.9%	69	2,382	2.9%
WLSTNDBC	25	162	6,007	2.7%	66	2,294	2.9%
WTCYNDBA	10	15	946	1.6%	0	211	0.0%
WYNDNDBA	77	278	528	52.7%	91	98	93.2%

HAI Geocoded Data is Questionable

North Dakota State
Wire Centers and Census Blocks Omitted by Hatfield Model 5.0



This map displays the 6 defined BLR wire centers and 7,608 Census Blocks that are untouched by any Hatfield Model 5.0 Cluster.

BCPM Customer Location Process is more Refined

- BCPM captures information at microgrid level
  - Whether geocoded or road apportioned
- Through grid aggregation, microgrid information is rolled up
  - Microgrids get rolled up to quadrants within the ultimate grids
- The BCPM still retains the actual information at quadrant level
  - Data actually used in building the network

BCPM Customer Location Process is more Refined

- Correlation of Actual Values to Model Predictions

Correlation Between Model Predicted Locations and Actual Locations: Rural Wire Centers

Wire Center	CLLI	State	Company	Prediction Correlation BCPM 3.1	HM 5.0
Albany	ALBYTXPO	TX	Southwestern Bell	0.69	0.45
Champion	CHMPNCXA	NC	Wilkes Telephone	0.62	0.40
Clinton	CLTNKYES	KY	Bell South	0.98	0.69
Gillette	GLTTWYMA	WY	US West	0.81	0.46
Renville	RNVLMNRN	MN	US West	0.67	0.28
Sicily Island	SCISLAMA	LA	Bell South	0.88	0.55
Vernon	VERNTXLI	TX	Southwestern Bell	0.79	0.60

Notes:

1. Correlations are for BCPM ultimate grids with density < 5 HU per sqmi.
2. Gillette, WY analysis limited to three, low-density, contiguous CBGs.
3. HM 5.0 cluster locations allocated to utlimate grids based on cluster area/grid area overlap.

BCPM Customer Location Process is More Refined

- BCPM retains customer data at a smaller area
  - These smaller areas are what the BCPM builds to
- A ratio of HAI average cluster area to BCPM quadrant area at the wire center level
  - Unweighted average
    - C&P Maryland 639%
    - USWest North Dakota 510%
  - Minimum
    - C&P Maryland 103%
    - USWest North Dakota 311%
  - Maximum
    - C&P Maryland 1832%
    - USWest North Dakota 812%

Geocoding is Theoretically Ideal

- Issue remains in regard to proprietary nature of data
  - Interested parties cannot review the data
- Currently, only in theoretical stage
  - HAI sponsors have openly stated
    - Density zone 0-5 and 5-100 receive 99.4% of funding from HAI
    - Geocoding success rate of Metromail data is
      - 15% in 0-5, 43% in 5-100
    - However, geocoding success rate of all customers (Res and Bus)
      - 7% in 0-5, 21% in 5-100
        - Based upon assumption that Metromail has 70% of total residential customers and residential makes up 70% of customers

Geocoding is Theoretically Ideal

- Fact that you geocoded has little bearing on model algorithms if points are discarded when network is built
- Given the known quality problems of current geocoding and the fact that BCPM has always been able to accept geocoded points
  - It is vital that surrogate method is accurate
- BCPM road apportionment and retainment of information at much finer level (quadrant) is superior

BCPM can use Geocoded Data

- Overview of process under development
  - Selecting customer database (e.g., Metromail)
  - Selecting geocoding package (e.g., Centrus)
  - Geocode customers (possible approach)
    - For CB's where success rate exceeds 85%
      - Use geocoded points
      - Gross up to 100%
    - For CB's where success rate is below 85% or geocoded data is unavailable
      - Use current road apportionment process for CB data
        - avoids bias of mixing known and unknown
      - OR Use geocoded points and augment with current CB process

BCPM Can use Geocoded Data

- Overview of process under development (cnt'd)
  - Slight modification to grid approach for geocoded areas
    - Same aggregation routine
    - Locate grid centroid at population centroid
    - In quadrants,
      - Locate centroid at population centroid
      - Area of quadrant is area of polygon formed from points
      - Capture road length within the polygon of the goecoded points

Improvements Being Investigated for Future Releases

- Building reports to display UNE costs in Standard Output
- Greater use of road length
  - Determine lot frontage as ratio of road length/lots
- Modification of grid aggregation
  - Determine if any modification could further optimize Grid Creation
- Incorporate GIS preprocessing into user platform
  - User controllable

Optimization: Not What it Seems

- HAI optimization is questionable
  - For the Life cycle costs comparison to determine fiber or copper placement
    - Analysis is based on hard coded inputs in distribution logic

fiber inv/strand-foot	$	0.1148
copper inv/pair-foot	$	0.0250
end office DLC offset/line	$	5.00
end office MDF inv/line	$	12.50

    - We increased Fiber costs by almost a factor of 200
      - no change in amount of fiber or copper that was installed
    - We did the same for copper and no changes occured
- Questions still remain on other "optimization" routines

Wrap Up

- BCPM is a superior model
  - BCPM is capable of using geocoded data
    - Alternative use of road apportionment is superior
    - Level of data passed to model is more refined
  - Geographic results are sensical
  - Road information is used to avoid overbuilding
  - Network is built to more refined customer location data
  - Density used in model reflects the gird
  - Switching and transport are superior

Wrap Up

- BCPM is more realistic
  - Builds a network that is ready to serve
    - Include housing units
  - Technology platform does not hinder future revision of what is defined as universal service
    - Not based on T1 technology
  - Model is capable of accepting actual data at wire center level and using it in modeling
    - Actual CLLI line counts
    - Actual switch investments
  - Amount of route miles is more in line with road distances

BCPM Tracks Closer to Actual Data

- In a comparison to actual reported loop lengths, BCPM is superior
- The state of Maine filed loop lengths for all Maine wire centers
  - Comparison to state average
    - Actual: 15,311
    - HAI: 18,893 (23% higher)
    - BCPM: 17,860 (14% higher)
  - Office by office range of differences
    - HAI: -60% to 229%
    - BCPM: -45% to 171%